

**CLAIMS**

What is claimed is:

1. An active noise attenuation system comprising:
- an air inlet duct housing having an inlet end into which air is drawn and
- 5 an outlet end operably connected to an engine;
- a sound detector for sensing noise emanating from said air inlet duct and generating a noise signal corresponding to said noise;
- a speaker mounted within said air inlet duct housing and facing said inlet end;
- 10 a resonator supported by said housing and positioned between said speaker and said engine for reducing low frequency engine noise; and
- a controller for receiving and phase shifting said noise signal and sending a control signal to said speaker to generate a sound field to attenuate said noise.
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2. A system according to claim 1 wherein said resonator attenuates said low frequency noise resulting in an attenuated engine noise level and said sound detector senses said attenuated engine noise level.
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3. A system according to claim 1 including an air filter for filtering contaminants from the air, said filter being positioned behind said speaker.

4. A system according to claim 3 wherein said resonator is mounted to said filter.

5. A system according to claim 4 wherein said filter is cylindrically shaped with a first end fitting over said resonator and a second end fitting over said outlet end.

6. A system according to claim 3 wherein said resonator extends outwardly from said housing between said filter and said engine.

7. A system according to claim 1 wherein said resonator reduces low frequency engine noise within a predetermined range.

8. A system according to claim 7 wherein said speaker is less than four hundred millimeters in diameter.

9. An active noise attenuation system comprising:
- an engine for generating low frequency noise having a profile defining a peak noise;
  - an air inlet duct housing having an inlet into which air is drawn and an outlet operably connected to said engine;
  - a speaker mounted within said air inlet duct housing and facing said inlet;
  - an air filter mounted within said housing between said inlet and outlet for filtering contaminants from the air;
  - a resonator supported by said housing and positioned between said speaker and said engine for attenuating said peak noise resulting in an attenuated low frequency engine noise;
  - a sound detector for sensing said attenuated low frequency engine noise and generating an attenuated low frequency engine noise signal; and
  - a controller for receiving and phase shifting said attenuated low frequency engine noise signal and sending a control signal to said speaker to generate a sound field to attenuate said attenuated low frequency engine noise signal.
10. A system according to claim 9 wherein said resonator attenuates said peak noise within a predetermined range.

11. A system according to claim 10 wherein said speaker is less than four hundred millimeters in diameter.

12. A system according to claim 10 wherein said filter is cylindrically  
5 shaped with a first end fitting over said resonator and a second end fitting over said outlet end.

13. A system according to claim ~~20~~<sup>10</sup> wherein said resonator extends radially outward from said housing between said filter and said engine.

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